Reducing repeat paediatric emergency department attendance for non-urgent care: a systematic review of the effectiveness of interventions

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ABSTRACT

Objective Non-urgent paediatric ED (PED) visits appear to contribute a large portion to the growing use of EDs globally. Several interventions have tried to curb repeated non-urgent attendances, but no systematic review of their effectiveness exists. This review examines the effectiveness of interventions designed to reduce subsequent non-urgent PED visits after a non-urgent attendance.

Method A systematic review design. A systematic search of four databases and key journals was conducted from their inception to November 2018. Experimental studies, involving children aged 0–18 years presenting to an ED for non-urgent care, which assessed the effectiveness of interventions on subsequent non-urgent attendance were considered.

Results 2120 studies were identified. Six studies, including four randomised controlled trials (RCTs) and two quasi-experimental, were included. Studies were of moderate quality methodologically. All studies originated from the USA and involved informational and/or follow-up support interventions. Only two RCTs demonstrated the longest duration of intervention effects on reducing subsequent non-urgent PED attendance. These studies identified participants retrospectively after ED evaluation. The RCT with the largest number of participants involved follow-up support by primary physicians. Meta-analysis was impractical due to wide heterogeneity of the interventions.

Conclusions There is inconclusive evidence to support any intervention aimed at reducing subsequent non-urgent PED visits following a non-urgent attendance. The long-term impact of interventions is limited, although the effect may be maximised if delivered by primary care providers in children identified after their ED attendance. However, further research is required to evaluate the impact of any such strategies in settings outside the USA.

What is already known?

- Children presenting to EDs for non-urgent care is an internationally significant phenomenon, and this population constitutes a substantial percentage of ED attendance.
- The impact of ED-based interventions to reduce non-urgent visits is not clear.
- This phenomenon causes multifaceted effects on EDs such as crowding, increased cost, quality and clinical safety issues and increased staff burnout and attrition.
- Parental reasons for using ED resources for non-urgent care are multifactorial.

What this study adds?

- Studies evaluating effectiveness of interventions in reducing repeat paediatric ED attendance for non-urgent care to date display significant heterogeneity limiting their generalisability.
- The effect of any intervention to reduce repeat paediatric ED attendances for non-urgent care over the long term appears limited.
- The strategy with the most potential benefit identified children after their ED attendance and was delivered by primary care providers.

INTRODUCTION

Globally, paediatric ED (PED) attendances are growing. For instance, in England, nearly 5 million children attend ED annually.[1] There is a concern that many of these visits do not require the services of ED and several studies have noted a high proportion of non-urgent ED visits by children, with figures ranging from 39.9% to 60%.[2–5] There is no consensus on exactly what makes up a non-urgent visit, which may account for the heterogeneity in the proportion of non-urgent ED visits reported in the literature. Non-urgent visit is generally thought to be a visit that can safely wait for evaluation or care. Such visits are identified either prospectively during triage or retrospectively after an ED physician evaluation. Arguably, it may be difficult to assert that an ED visit is non-urgent if the medical professional at triage does not consider it so at the time. However, the urgency of a visit may be adequately judged after considering physician evaluation, investigations, diagnoses and treatments.

Parents commonly present their children with minor illness to EDs often for reassurance and self-care advice[6 7] and children find the ED environment distressing.[8] Nonetheless, a recent report published that 61% of parents presenting their children to EDs with non-urgent illness in England were likely to attend again with the same problem.[5] There is therefore an urgent need for evidence-based interventions to reduce non-urgent PED visits as part of the solution to the highly complex phenomenon of ED attendance and to promote better continuity of care. This systematic review examined data on

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Table 1 The review concepts using the PICOS framework and eligibility criteria

Population	**Children (aged 0–18 years) presenting to ED with a minor illness.**
Intervention	All interventions including but not limited to educational, social, primary care and barrier interventions such as patient education, telephone consultation, gatekeeping, co-payment, urgent care network and extended hours.
Comparator	Standard ED care.
Outcome	Primary outcome: patient-level reduction on future attendance for non-urgent ED care for minor illness. Secondary outcomes: future primary care visits and healthcare utilisation cost.
Study design	Experimental studies (limited to RCTs and quasi-experimental).
Inclusion criteria ► Children aged 0–18 years who presented to an ED with a minor illness. ► RCTs and quasi-experimental studies. ► Studies that assessed the impact of various interventions on subsequent paediatric non-urgent ED attendance for minor illness. ► Studies published in the English language.	Exclusion criteria ► Frequent ED users are excluded due to their reported chronic medical, mental and behavioural health problems, patterns of ED utilisation and higher hospital admissions.[17] ► Children attending ED for follow-up diagnostic investigations. ► Observational studies.

PICOS, Population, Intervention, Comparison, Outcome and Study design; RCT, randomised controlled trial.

interventions aimed at reducing subsequent non-urgent PED visit after attendance for non-urgent care.

METHODS

The review sought to answer the question, 'what interventions, compared with standard ED care, are effective in reducing subsequent non-urgent PED attendance after a visit for non-urgent care?' The Preferred Reporting Items for Systematic Reviews and Meta-Analyses[9] guided the reporting of this review. The review protocol is unregistered.

Search strategy

Four electronic databases: MEDLINE, EMBASE, CINAHL and PubMed were initially searched from their inception to June 2014. Search was updated in June 2016, January 2018 and November 2018. Trial registries, 'clinicaltrials.gov', 'ISRCTN registry' and relevant conference proceedings and journals, including Royal College of Paediatrics and Child Health, Archives of Diseases of Childhood and Emergency Medicine Journal were also searched. A manual search of the reference lists of included studies and salient reviews were also performed to identify relevant articles that were not identified in the database searches. Searches were not limited by year, intervention type or context/setting, but were restricted to reports published in English Language. The Population, Intervention, Comparison, Outcome and Study design framework was used to formulate the review question and identify search terms (table 1) (see online supplemenatry appendix 1).

Study selection

All the identified citations were imported into Endnote X7 and duplicates were removed. One author (BAP) independently conducted the study searches and both reviewers independently assessed the inclusion of potentially relevant reports. The titles and abstracts of identified reports were sifted, and the full-text of potential articles were retrieved and assessed for inclusion based on the eligibility criteria.

Assessment of risk of bias, data extraction and synthesis

BAP conducted the quality assessment of the studies and the data extraction, which were verified by the second author (PH). Included studies were critically appraised for quality using the standardised critical appraisal instruments for RCTs and comparable cohort studies (the latter was used to assess the quasi-experimental studies) from the Joanne Briggs Institute Meta-Analysis of Statistics Assessment and Review Instruments (JBI-MAStaRI).[10] Data were extracted using the JBI-MAStaRI extraction tool for experimental studies.[10] Findings were tabulated and presented in a narrative summary. Meta-analysis was impractical due to the heterogeneity of the extracted data, mainly in the interventions and the time frames for assessing the outcomes (tables 3–4).

RESULTS

Search results

Two thousand one hundred and twenty citations were identified by the search strategy, with 1770 titles and abstracts screened for eligibility after removing duplicates. Thirty-two full-text articles were retrieved and assessed for inclusion. Six studies, comprising four RCTs[11–16] and two quasi-experimental[15 16] fulfilled all the inclusion criteria. Details of excluded studies and reasons for exclusion are available in online supplemenatry appendix 2. No additional study was identified through the manual search of reference lists of included studies and previous reviews or found in the trial registries and key journals or during the literature search updates. Study identification and selection are represented in figure 1.

Study and participant characteristics

All the included studies originated from the USA and sought to determine the effectiveness of informational and/or follow-up support in reducing subsequent non-urgent PED visits. Studies were published between 1996 and 2014 and involved 5944 children aged up to 18 years. The majority of the participants were reported to be registered with a primary care practitioner and to have health insurance. Two studies[11 14] reported that a minority of the participants had chronic conditions. Nonetheless, the comparison groups were reported to be comparable at recruitment. Four studies[11 12 15 16] defined non-urgent visit based on triage scores and the remaining two studies[13 14] based their definitions on ED physician evaluation and diagnoses. The definitions of non-urgent visits by the individual studies are provided in tables 3–4. Four studies[11 12 15 16] therefore enrolled patients prospectively after ED nurse evaluation, one study[13] recruited participants retrospectively from ED administrative data, and another after ED physician evaluation.[14] Only two studies[11 12] provided evidence of sample size calculation with 80% power and 0.05 level of significance, increasing the chance of type 1

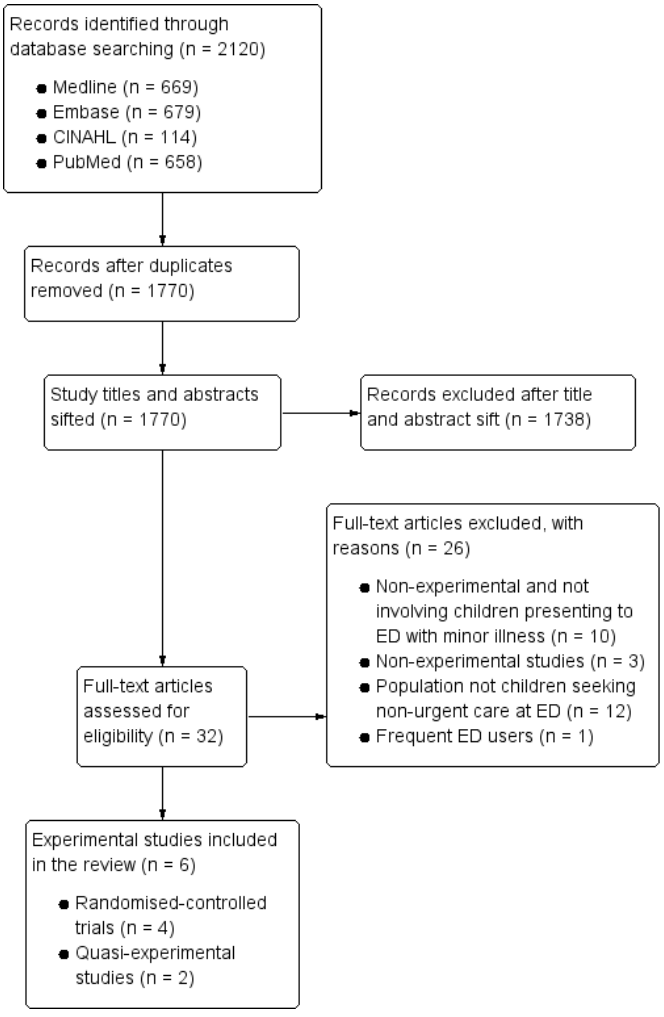

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram of study identification and selection.

or 2 error in the other studies. All six studies were published in peer-reviewed journals, and none was found to be registered in the ISRTN registry or the 'ClinicalTrials.gov database.

Risk of bias assessment

All the included studies were of moderate quality (table 2). None of the RCTs[11–14] used true randomisation, and they failed to report on blinding of outcome assessors, raising the issues of selection and detection bias. The quasi-experimental studies[15 16] provided little or no information on potential confounders such as parental characteristics and family dynamics of the study participants. Only one included study[13] reported on participants who withdrew and were lost to follow-up, and conducted an intention-to-treat analysis.

Description of interventions

All the included studies provided some form of informational support, regarding home management of minor illness, primary care services or appropriate use of ED services. Two of the studies offered follow-up support (tables 3–4).

The site of interventions

In four of the studies,[11 12 14 15] interventions were ED-based and administered as part of the ED discharge procedure. In one study,[13] intervention was delivered by a designated primary care

Table 2 Assessment of methodological quality

Study	Random assignment to the intervention group	Participants blinded to intervention allocation	Allocation to groups concealed from the allocator	Participants who withdrew described and included in the analysis	Outcome assessor blinded to intervention group	Comparable groups at study entry	Groups treated identically aside the named intervention	Outcomes measured similarly for groups	Outcome measured in a reliable way	The appropriate statistical analysis used	Overall quality
Randomised controlled trial studies											
Strum *et al*[14]	No	Yes	No	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Moderate
Racine *et al*[13]	Unclear	Yes	Unclear	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Moderate
Chande *et al*[11]	No	Yes	No	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Moderate
Chande and Kimes[12]	No	Yes	No	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Moderate

Study	Sample representative of population	Participants at similar level of acuity	Bias minimised in the selection of case and controls	Confounding factors identified and strategies to deal with them stated	Outcomes assessed objectively	Sufficient period of follow-up	Participants who withdrew or were lost to follow-up described and included in the analysis	Outcomes measured in a reliable way	The appropriate statistical analysis used	Overall quality
Quasi-experimental studies										
Herman *et al*[15]	Yes	Yes	Yes	Yes	No	Yes	Unclear	Unclear	Yes	Moderate
Grossman *et al*[16]	Yes	Yes	Yes	Unclear	Yes	Yes	Unclear	Yes	Yes	Moderate

Table 3 Characteristics of RCT studies

Study	Design	Definition of non-urgent visit	Population	Intervention	Effect on non-urgent PED use and PCP attendance and other outcomes	Weaknesses
Strum *et al*[14]	RCT	Patients with low initial triage acuity who did not require tests and investigations, and hospitalisation after ED physician evaluation.	ED of a children's hospital. Intervention group: 164 participants. Control group: 168 participants. Participants recruited as they attend ED for non-urgent care. Publicly insured n=98. Privately insured n=154.	Subjects in the intervention group were provided with a hand-out on self-identified PCP office hours, location, the scope of practice and steps to take to address medical concerns with a 10 min session for explanation and questions. Intervention was ED-based.	No significant difference at 6 months follow-up between the two groups (18.4% intervention vs 12.8% control, p=0.14). At 12 months follow-up, there was significant difference between the groups (42.7% intervention vs 54.2% control, p=0.046). A significant difference in PCP attendance for sick visits between the groups (0.85 per intervention child vs 0.65 per control child) (rate difference 0.19 visit per child per year (95% CI: 0.0013 to 0.39, p=0.036).	No evidence of sample size calculation and intention-to-treat analysis. Method of randomisation and group allocation unspecified. No indication of concealed allocation. High risk of selection bias and possible error in intervention effect. No indication of participants who withdrew or were lost to follow-up.
Racine *et al*[13]	RCT	Patients diagnosed as having an episodic illness by an ED physician. Participants identified retrospectively after ED evaluation.	Patients of four primary care practices attending PED of an academic children's hospital. Intervention group: 2166 participants. Control group: 2080 participants. Participants recruited from ED records.	The intervention involved a telephone contact with participants 72 hours after index non-urgent PED visit to inquire about follow-up and schedule a primary care follow-up if necessary, provide counselling on appropriate PED use and availability of after-hours services at primary care sites. The intervention was primary care-based.	Significant reduction in the number of visits to PED by subjects in the intervention groups compared with those in the control group (17.7% vs 20.7%, p<0.001) 12 months after the index PED visit. No significant difference in follow-up visits made to primary care sites (p=0.68).	Method of randomisation and group allocation unspecified. No evidence of sample size calculation. High risk of selection bias.
Chande *et al*[11]	RCT	Enrolled based on triage nurses' evaluation.	Publicly insured n=1847. Commercially insured n=1777. Uninsured n=343. PED of a university hospital. Intervention group: 69 participants. Control group: 61 participants. Participants were recruited as they attend ED for non-urgent care. Publicly insured n=88. Privately insured n=5. Uninsured=20.	Participants in the intervention group were provided with a sixth-grade reading level booklet on common childhood medical problems and watched a 10 min video. Intervention covered information on the role of PCP, temperature, asthma, diarrhoea, cold and chicken pox management and how to comfort a crying baby and child safety. Only 48 subjects in the intervention group watched the video. Intervention was ED-based.	No statistical difference in the number of participants in the intervention group who returned to PED with minor illness and those in the control group (p=0.46). No significant difference (p≥0.99) in the number returning to PED after watching the videotape and those who did not.	Randomisation and group allocation unspecified. No indication of concealed allocation. High risk for selection bias. No intention-to-treat analysis; 9% attrition in both comparison groups. No information provided on the characteristic of participants who were lost to follow-up or withdrew.
Chande and Kimes[12]	RCT	Based on triage nurse's categorisation of the patients' presenting complaints.	ED of a children's hospital. Intervention group: 102 participants. Control group: 93 participants. Participants recruited as they attend ED for non-urgent care. All participants on Medicaid care plan.	The intervention was based on PRECEDE-PROCEED model. It constituted a 20–30 min session involving a detailed review of child's medical record with a parent, discussion on PCP roles, the importance of continuity of care, availability of primary care expanded hours and 24 hours telephone advice service, scheduling and keeping follow-up appointment with PCP and appropriate PED visits. Concerns related to accessing PCP were addressed. Intervention was ED-based.	No significant difference in the number of families in the intervention and control groups who made at least one (p=0.59) or two or more (p=0.95) ED visits for minor illness at a year follow-up. Non-significant change in the number of participants who made at least one visit to their PCP between the groups (p=0.59) 12 months following the intervention.	Randomisation and group allocation insufficiently described. No indication of concealed allocation. There is a risk for selection bias. No intention-to-treat analysis and no information provided on the characteristics of those lost to follow-up or withdrew from the study.

PCP, primary care provider; PED, paediatric ED; RCT, randomised controlled trial.

Table 4 Characteristics of quasi-experimental studies

Study	Design	Definition of non-urgent visit	Population	Intervention	Effect on non-urgent PED use and other outcomes	Weaknesses
Grossman *et al*[16]	Prospective controlled study	Stable non-distressed children whose care could be delayed at least 4–6 hours and/or could be referred to a clinic after ED nurse evaluation.	ED of a children's hospital. Two intervention groups: minimal intervention=135 participants. Case management=180 patients. Control group: 613 participants. Participants recruited as they attend ED for non-urgent care. All participants were on Medicaid care plan.	Subjects in the intervention groups were educated on the relevance of primary care and preventative care. Those without PCP were assisted in choosing and registering with one and provided with information on PCP office hours, the scope of practice, after-hour services and availability of public transportation and parking. They were assisted in scheduling a PCP follow-up appointment and followed up to determine compliance. Participants in the minimal intervention group were followed up by a clerical worker while those in the case management group were followed up by a paediatric nurse or a paediatric social worker for 3 months after index PED interaction and provided with in-depth information concerning potential barriers to primary care. The cost of follow-up by a clerical worker was cheaper ($6.13/patient) compared to follow-up by a paediatric nurse (£30.99/patient) or a social worker ($30.43/patient). The intervention had two parts: ED-based and community follow-up.	11.1% and 14.5% fewer non-urgent PED visits among the minimal and case management intervention groups, respectively compared with the comparison group ($p<0.01$) 6 months after index PED visit. No significant difference during 6–24 months. Expenditure for non-urgent care reduced significantly in the first 6 months follow-up with a saving magnitude between 10.6% and 12.5%.	No randomisation of participants to groups. No indication of whether the groups were statistically comparable at recruitment.
Herman *et al*[15]	A prospective study using prepost design	Based on triage nurse's categorisation of the degree of the patient's medical needs	PED of a medical centre Intervention group: 113 participants No control group Participant recruited as they attend ED for non-urgent care Publicly insured=83 Privately insured n=37	Subjects were given a fourth-grade reading level children's health aid book providing information on 50 common childhood medical problems plus a 5–10 min session on how to use the book. Intervention was ED-based	Significant reduction in the number of participants making at least one visit to PED 6 months following the intervention (73% preintervention to 43% postintervention, $p<0.0001$). No statistical difference in the number who had been to PCP in 6 months following the intervention (83% preintervention vs 85% postintervention).	No control group. Nearly half of the intervention participants (46%) were lost to follow-up.

PCP, primary care provider; PED, paediatric ED.

provider 72 hours following the participants' non-urgent ED visit while in the other study,[16] the intervention was of two parts: initial ED-based part delivered as part of discharge procedure followed by a community follow-up for up to 3 months by a paediatric nurse, social worker or a clerical worker.

Type of interventions

The content of the interventions included medical information on home management of minor illness,[11 15] primary care-specific information with regard to scope of practice and out-of-hours services,[11–16] information on appropriate ED services usage[12 13] and follow-up of participants to arrange and encourage subsequent visits to primary care.[13 16] Interventions were delivered either through printed materials,[11 13 15] videotapes,[11] in-person sessions[11 12 14–16] or telephone sessions.[13] Studies either provided one form of support[11 15] or multiple,[16] using one mode of delivery[12 13] or multiple.[11 14–16] Notably, almost all the studies[11 13–16] provided some primary care-specific information. Duration of interventions varied from 5 min to 3 months. Five studies[11 13–16] failed to report on the theoretical constructs of the interventions explicitly. None of the studies involved parents in the content development or reported on health providers' perception of the interventions. However, primary care providers or paediatric nurses were involved in the development[14–16] or the delivery of the interventions.[13 16]

Standard outcomes of measure

The primary outcome measure reported by all the studies was subsequent non-urgent ED visits. In almost all the studies,[11–15] monitoring for subsequent non-urgent visits occurred only within the same ED as for original visits. Therefore, if some participants attended EDs elsewhere, they may have been missed in the analysis. By using participants' insurance claims, one study[16] was able to assess participants' non-urgent visits to EDs other than the ED they were recruited from. The only other outcome that was reported across four of the studies was primary care attendance following interventions.[12–15] One study published on the cost of the intervention and healthcare utilisation cost for non-urgent visits following the intervention.[16] The time frames for following up on participants to assess outcomes varied, ranging from 6 to 24 months.

Assessment of outcomes

Four studies, two RCTs[13 14] and the two quasi-experimental studies[15 16] reported statistically significant reductions in subsequent non-urgent ED attendance following the interventions. The magnitude of reduction was between 3% and 30%. The RCT study by Racine *et al*[13] identified participants retrospectively after their ED visit for minor illness. This involved the largest number of participants. Participants in the intervention group were contacted via telephone by a primary care provider 72 hours following their non-urgent ED visit. They were counselled about primary care services and appropriate use of ED, and assisted to register and schedule primary care follow-up, where necessary. The researchers reported a 3% statistically significant difference in subsequent PED attendance for non-urgent care between the comparison groups at 12 months. The RCT study by Strum *et al*[14] also recruited participants after ED physician evaluation into their RCT study. As part of the discharge care, participants in the intervention group were provided with a written information on self-identified primary care provider's scope of practice plus a 10 min session for explanation and questions. At 6 months follow-up, no significant reduction in non-urgent ED visits was reported in the intervention group; however, at 12 months, a statistically significant difference of 11.5% between the comparison groups was reported. They reported a non-significant increase in subsequent non-urgent ED visits in the intervention group at 6 months.

The pre-post study by Herman *et al*[15] on the other hand, recruited participants based on their triage scores, and provided them with a low literacy level children's aid book, which provided information on how to manage 50 common childhood medical problems at home plus a 5–10 min session on how to use it. The authors reported a 30% reduction in PED attendance for minor illness at 6 months. Lastly, in the non-randomised study by Grossman *et al*,[16] participants were identified based on their triage scores. Prior to ED discharge, those in the intervention group were provided with information on primary care and preventative care, and assisted to register and schedule follow-up primary care, where necessary. Subsequently, participants in the intervention groups were followed up for up to 3 months by a clerical worker (minimal intervention group) or paediatric nurse or social worker (case management group) to provide support in addressing potential barriers to primary care. The authors reported a 11.1% and 14.5% reduction in subsequent non-urgent visits at 6 months in the minimal and case management groups, respectively, with no significant effect reported at 12 and 24 months following the intervention.

All the studies that assessed primary care attendance reported a non-significant increase in overall attendance rates following interventions. One study[14] indicated that a subsequent reduction in non-urgent ED attendance was associated with a statistically significant increase in the number of sick visits to primary care among the intervention group at 12 months. However, the actual reported effect size appeared negligible (95% CI: 0.0013 to 0.39). There was no evidence of an upward drive in primary care sick visits in the other three studies[13 15 16] that reported a significant decrease in subsequent non-urgent ED attendance. One study reported that a reduction in subsequent non-urgent ED attendance was associated with a reduction in healthcare expenditure for non-urgent ED visits.[16] This study also reported that the cost of follow-up support was cheaper for participants in the minimal intervention group who were followed up by a clerical worker.

DISCUSSION

This review is the first systematic review to assess the effectiveness of interventions aimed at children presenting to ED with non-urgent illness. The interventions trialled appeared to target some of the reported parental reasons for non-urgent ED attendance, including parents' perceived urgency of their child's problem and desire to seek early care, as well as availability, accessibility and satisfaction issues with primary care,[5–7] by providing informational support on identification and home management of minor illness, information on primary care services and assistance to access primary care. However, the review findings showed inconclusive evidence for the effectiveness of informational and/or follow-up support on repeat non-urgent PED attendance. Although four out of the six reviewed studies reported a statistically significant reduction following their interventions, only two RCTs reported a decrease in the long-term period.

One was the RCT that involved the largest number of participants in the review and consisted of a telephone follow-up intervention provided by primary care providers.[13] This suggests that a simple follow-up primary care-based intervention may reduce future non-urgent ED use. The other was the RCT which

provided primary care-specific information. These successful RCT interventions were designed with or delivered by primary care providers and identified participants after ED physician evaluation. Therefore, interventions developed and administered by or with primary care providers and targeting non-urgent ED users identified retrospectively after ED physician evaluation may be more beneficial in reducing non-urgent PED attendance. Indeed, the commonly reported parental reasons for non-urgent PED attendance appear to involve issues of availability, accessibility, the convenience of and satisfaction with primary care services.[7] However, in relation to the magnitude of non-urgent PED visits, the impact of such interventions may only be part of the complex and multifactorial solutions needed to address the annual increase in overall ED attendance.

Notably, there was insufficient evidence that short ED-based informational support provided to non-urgent PED users identified after triage evaluation reduce subsequent non-urgent ED visits. There was also no evidence that parental education on home management of minor illness and appropriate use of ED decrease future non-urgent ED visits in the long-term period compared with providing support about primary care services. Arguably, these interventions are counterintuitive to parents' desire to seek early care for their children, which has been reported to influence their decisions.[5–7] Therefore, future informational support interventions may need to be co-designed and planned with this subgroup population to ensure they are targeting the specific parent-level factors influencing non-urgent attendance. Moreover, there was insufficient evidence to demonstrate that reducing future non-urgent ED attendance resulted in subsequent primary care visits. However, all the studies were conducted in the USA, and therefore the findings may not be generalisable. This is because confounders such as health insurance, primary care availability and socioeconomic factors may play an important part in the non-urgent attendance, limiting the transferability of the findings to other contexts. Consequently, more rigorous intervention development and evaluation are required from different geographical contexts to draw concrete conclusions about interventions to inform health policies and practices. It is noteworthy that there are other types of studies (see online supplemenatry appendix 2) that have looked at interventions to reduce repeat visits to EDs or ED utilisation in general, however, none of them focused explicitly on repeat attendance after PED attendance for non-urgent illness.

Limitations

The main limitation of this review is the inability to use meta-analysis for synthesising the results to get a pooled estimate of intervention effects due to the high level of heterogeneity observed in patient characteristics, interventions and outcome measures. All the included studies were conducted in the USA. Moreover, the inclusion of quasi-experimental studies may have introduced some bias as there were no randomisation or comparison groups. Furthermore, we may not have identified some relevant studies due to the exclusion of non-experimental studies and the inclusion of only English-Language publications. All the studies, but one, were small and all the studies failed to report the 95% CI for the reported primary outcome measure, limiting the conclusions which could be drawn. Moreover, long-term outcome measures would have contributed significantly to the findings as multiple ED attendance in a short-term becomes frequent ED use, which tends to be uncommon in the paediatric population.

Direction for future research

Our study highlights the following key gaps in the current evidence, which are priorities for future research in this area. First, non-urgent PED attendance is an internationally widespread phenomenon. However, there were no experimental data from countries other than the USA, demonstrating insufficient quantitative research commitment to the phenomenon of non-urgent PED attendance. More evidence is needed from different global contexts. Second, very little is known about the cost elements of the interventions and the economic benefits of reduced non-urgent PED attendance. Such cost-effectiveness analysis is required to guide the design and implementation of future interventions. Lastly, although our study search was unrestricted by intervention type, all included studies sought to determine the effectiveness of patient-centred informational and follow-up support in reducing subsequent non-urgent ED visits.

Further experimental research assessing the effectiveness of other intervention types including social and primary care, urgent care network, co-located and barrier interventions in the PED population is required.

CONCLUSION

This review has demonstrated that there is inconclusive evidence to support any specific strategy aimed at reducing subsequent attendances to PED after attendance with non-urgent illness. The long-term impact of any such strategies is limited, although the effect may be maximised if delivered by primary care providers in children identified after their ED attendance. Further research is required to evaluate impact of any such strategies in settings outside the USA prior to widespread implementation. The review findings should be of particular interest to commissioners and primary care/public health policymakers as well as hospital and ED managers who may be encouraged to implement ED interventions without a sound evidence base.

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